Mobile Application to Calculate Efficiency of Cyclone

by

Najmah Nabilah Binti Zulariffin
16462

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information Communication Technology)

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Universiti Teknologi PETRONAS
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Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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Approved by,

_____

(DR VIVIAN YONG SUET PENG)

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own. The original work contained herein have not been undertaken or done by unspecified sources or persons.

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NAJMAH NABILAH BINTI ZULARIFFIN

ABSTRACT

The paper proposes a mobile application for chemical engineer to calculate efficiency of the cyclone at anytime and anywhere. This report will focus on the introduction of the project, followed by the literature review, methodology used in complete the mobile application for calculate efficiency of the cyclone, result and discussion of the project lastly conclusion and recommendation from this project. Moreover, the proposed design of the mobile app also has been attached. Techniques that have been used in the project were study and making comparison between existing ways, study about the flow of the application and research on how to develop mobile app. By developing this project, hopefully the mobile app will help chemical engineer in calculate efficiency of the cyclone.

ACKNOWLEDGEMENT

First of all, I would like to thank Allah SWT (the Almighty), for His countless guidance and blessings throughout this period. In addition to that, I would like to thank my family and friends for the encouragement; support and making me believe that I can complete the tasks.

Certainly, my training could not have been successful without final year project supervisor Dr. Vivian Yong Suet Peng, Dr Rohiza and Mr Zamri. They have not only served as my supervisors but also patiently guided me throughout the Final Year Project (FYP) process, never accepted less than my best efforts. I would also to thank them for their advices and opinions about my project in order to produce the best end product.

I thank to my classmate Wan Afifi because helps consulting me about the software needed for my project. Not forgotten, my pleasure to acknowledge all my family members and friends for their unceasing motivation, support and ideas from the beginning of this project. Last but not least, I dedicated a lot of thanks to all that have given fully support and help me either direct or indirectly along the completion of this project.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

In this modern era, smart learning or fast way to learn become the biggest aim in our daily life as student or engineer. Now almost everyone uses Smartphone to complete daily routines like alarm, check email, shopping online and deal with customer. This is the main reason why Mobile Application is very suitable in the way to make the calculation of the cyclone become more efficient rather than need to use software that located in user computer or laptop. With this I would like to introduce my project which is “Mobile App to calculate efficiency of the cyclone” which is designed for engineer used in complete the task at the fieldwork. So this is the reason why this topic was been choose as the Final Year Project. This report overall is about of Research, Methodology and Designed for my proposed project.

Cyclone is used by the control engineering to control primary particles like asbestos and heavy metals and more toxic than others particle. Air pollution subject becomes important in the control process industries that deal with environment, pollutant and how to manage the undesirable materials. In working industries, Process control is extensively enables and used in mass production of continuous processes such as oil chemical, power plant, oil refining and many other industries. So, this subject becomes one of the important subject for chemical engineering student to be master in order to be

able to manage the pollution and control the air pollutant emission from industrial sector.

In this new era, make mobile learning platform become more interesting and more attractive to generation Y. They can learn and make sure they get information at anywhere or anytime they want. Making use of the mobile applications to calculate the efficiency of the cyclone can make the task become easier and can get the fastest result. This mobile application will make the calculation of the efficiency of cyclone become more efficient, easy to learn and attractive. Besides, student can easily learn how to calculate the efficiency of the cyclone at anytime and anywhere. I believe that this app can make user easy to use the apps.

1.2 Problem Statement

1.2.1 Difficulty in solving numerical problem statement

There are the problems whereby control engineer do not have the mobile application and lack of simulation tools that make engineer task become easy and compatible to do it anywhere or at anytime.

1.2.2 Lack of calculator instrument in get fastest result

Based in the research there are software that can be used to calculate the efficiency of the cyclone but the software are not compatible to bring along to the site visit. So the control engineer will collect data first and process data later. It make the more time consuming in order to get the result.

1.3 Objectives

There are three main objectives:

- To study the current ways in calculating the efficiency of the cyclone
- To develop mobile application to calculate the efficiency of the cyclone

- To test the mobile application impact in fieldwork task

1.4 Scope of Study

In this Final Year Project (FYP) the planning is to make a mobile app to calculate the efficiency of the cyclone. Therefore the data and all the measurement will be scaled. The main function that will be implemented in this mobile app is calculator that can calculate the numerical problem occurs.

The project will focus on to the user aged between 19-30 years who are use android smart phone. Student of Universiti Teknologi Petronas will be the user of the mobile application.

Platform that are used in this project:

- MIT App Inventor.

The hardware required for this project

- Mobile phone
- Tablets

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

In designing a mobile application, there are many aspects of training which is required to be considered for employees.

In this review, few literatures have been selected to be primarily reviewed with some other supporting literatures. This section shall be divided into several points which are The Presence and Growth of mobile application in daily routine and show the comparative study between existing software.

2.2 The Presence and Growth of mobile application in daily routine

The usefulness of mobile devices has increased greatly in recent years allowing users to perform more tasks in a mobile context. This will increase the usefulness of the usability of these devices in some contexts. A small review was conducted in order to know about mobile usability models and found that usability is usually measured in terms of three attributes; effectiveness, efficiency and satisfaction.(Walker,2011) None of the attributes that can be ignore when developing the mobile applications. This could lead to an incomplete usability evaluation.

Advances in mobile technology have enabled a wide range of applications to be developed that can be used by people on the move. Developers sometimes overlook the

fact that users will want to interact with such devices while on the move. Small screen sizes, limited connectivity, high power consumption rates and limited input modalities are just some of the issues that arise when designing for small, portable devices. One of the biggest issues is the context in which they are used. As these devices are designed to enable users to use them while mobile, the impact that the use of these devices has on the mobility of the user is a critical factor to the success or failure of the application.

Current research has demonstrated that cognitive overload can be an important aspect of usability (Lena, 2013). It seems likely that mobile devices may be particularly sensitive to the effects of cognitive overload, due to their likely deployment in multiple task settings and limitations of size. This aspect of usability is often overlooked in existing usability models, which are outlined in the next section, as these models are designed for applications which are seldom used in a mobile context.

There are five attributes of usability:

- Efficiency: The completeness to achieve goals;
- Satisfaction: Feel easier and happy in using the mobile application
- Learn ability: The system should be easy to learn
- Memorability: The system should be easy to remember the way to use it.
- Errors: The system should have a low error rate, so that users make few errors during use the mobile application

In addition utility is the ability of a system to meet the needs of the user. If a mobile application fails to provide utility then it does not offer the features and functions required. The usability of the product becomes superfluous as it will not allow the user to achieve their aims. This definition identifies 3 factors that should be considered when evaluating usability.

- User: Person who use the mobile application
- Goal: Expected outcome
- Context of use: Users and task that need to be achieved

Each of the above factors may have an impact on the overall design of the product and in particular will affect how the user will interact with the system (Benneson, 2013). In order to measure how usable a system is, there are three measurable attributes

- Effectiveness: Accuracy and completeness
- Efficiency
- Satisfaction: Feel easier and happy in using the mobile application

2.3 Android

Android is software for mobile devices that has operating system, middleware and key applications. The architecture of the Android is like a stack with Application being the top layer and Linux Kernel being the bottom layer of the Android. (Sharma,2011). Core applications of Android include e-mail client, SMS program, calendar, maps, browsers and contacts which are mostly text input based. An analysis by Ericsson Consumer Lab in Southeast Asia and Oceania, where in Malaysia the usage of Android platform has increased by 16 percentage points to 63% this year from 47% in 2012, while tablet penetration has increased almost three-fold to 39% from 14%.(Khor,2013).

2.4 Importance of the Cyclone

Cyclonic separation is a method of removing particulates from an air, gas or liquid stream, without the use of filters, through vortex separation. Rotational effects and gravity are used to separate mixtures of solids and fluids. The method can also be used to separate fine droplets of liquid from a gaseous stream.

Separation of particles in the cyclone is due to the centrifugal force caused by the spinning gas stream; this force throws particles outward to the cyclone wall. Opposing this outward particle motion is an inward drag force caused by gas flowing toward the axis of the cyclone prior to discharge. All efficiency theories set up a balance between these opposing forces. By making different assumptions about gas flow through the

cyclone, various terms in the force balance can be dismissed as insignificant. Since the relative importance of these terms will change with cyclone design and operating conditions, it is unlikely that any single set of assumptions will predict cyclone efficiency accurately for all applications.

Because of its simplicity and low operating cost, is probably the most widely used dust collector in industry. With the growing concern for the environmental effects of particulate pollution, it becomes increasingly important to be able to optimize the design of pollution control systems. As a result, many studies have been made to characterize cyclone performance as affected by design and operational parameters. Mobile app will make the task become easier.

2.5 Existing Software

New software is presented which allows to calculate cyclone efficiency for a given geometry or to determine geometry for a desired efficiency is presented. It has been established for cyclones with relatively low solids loading (<10 g/m3) and it applies for pressure drop between 10 and 10 000 Pa, for cut diameter between 0.2 and 20 m, for volumetric flow rate from 10−4 to 1000 m3/s and for cyclone diameter from 0.01 to 3 m. The calculations are realised with four models presented in the literature. Comparison between model predictions and published measurements shows that models used in the software predict pretty well the experimental results, obtained in a large range of operating conditions. Moreover, a comparison of the results obtained with these four models permits to select the model the most adapted, depending on inlet flow rate, temperature and pressure used (Jullemier, 2002). Figure below show the available software name Sysmatec and online calculator that exist to calculate the efficiency of the cyclone.

2.5.1 Sysmatec

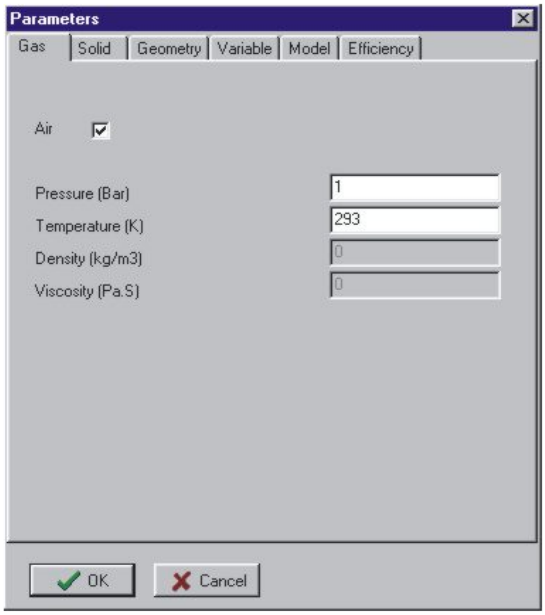

FIGURE 1. Enter the gas parameters

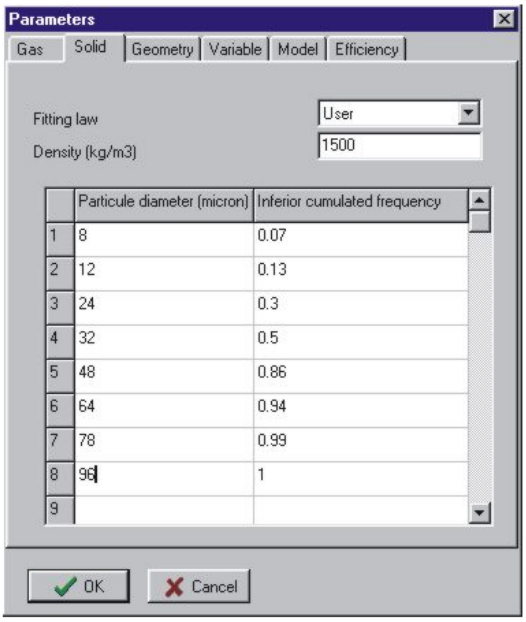

FIGURE 2. Enter the solid parameters

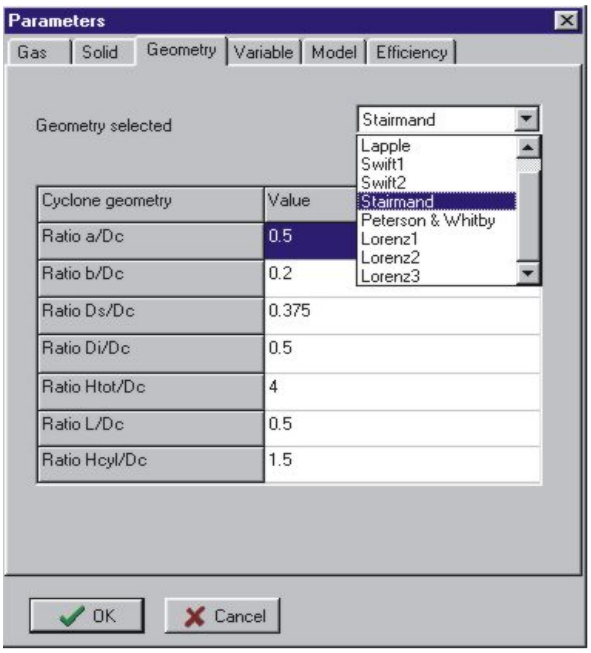

FIGURE 3. Choose an included geometry or entry your own geometry

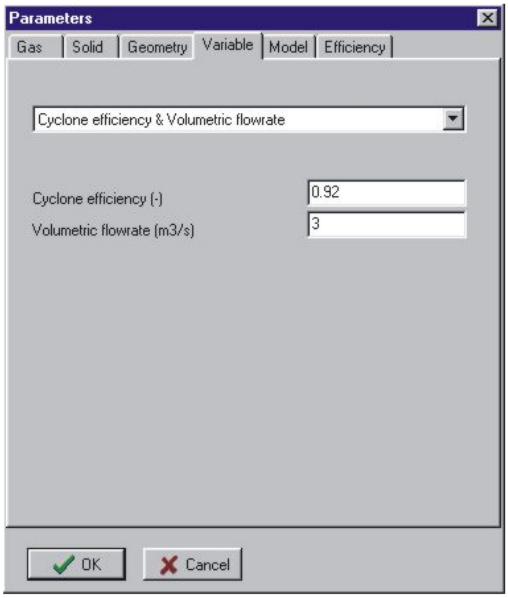

FIGURE 4. Choose the known variables combination

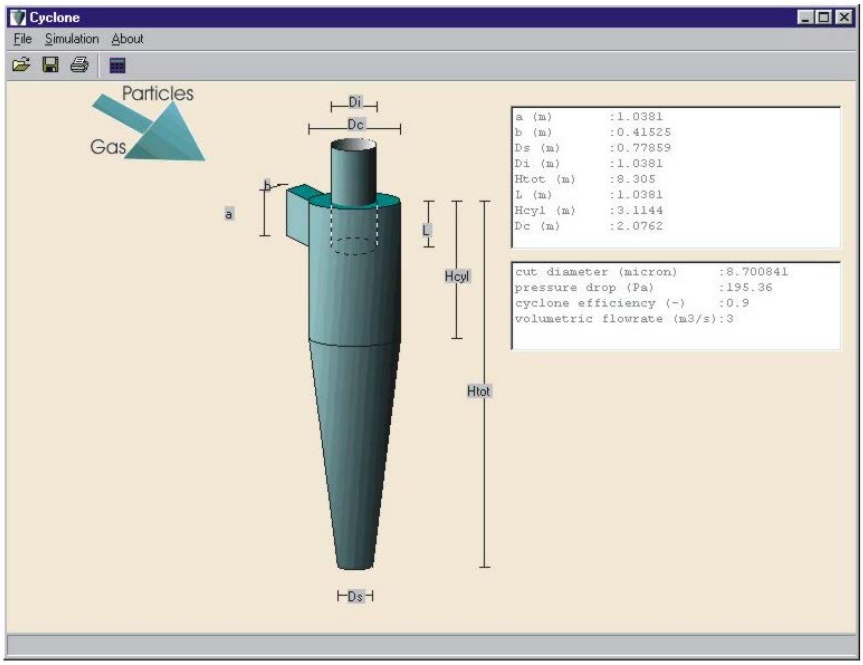

FIGURE 5. The efficiency for every particulars size is available in the parameters window.

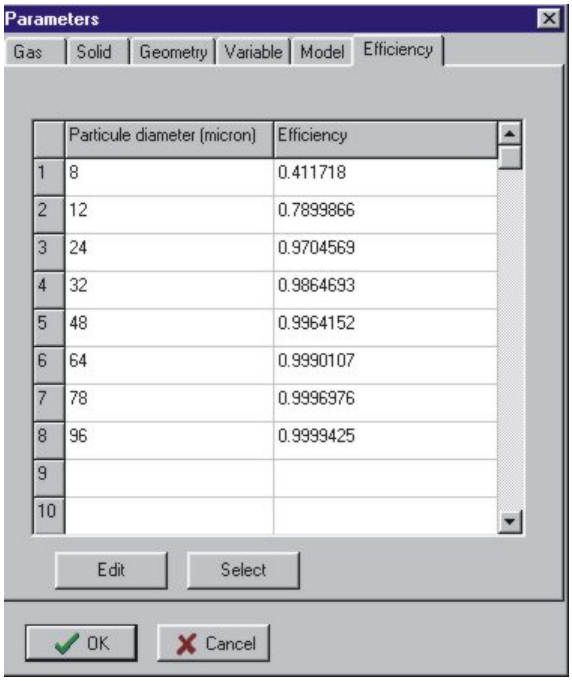

FIGURE 6. Conclusion of the result

2.5.2 Online Calculator

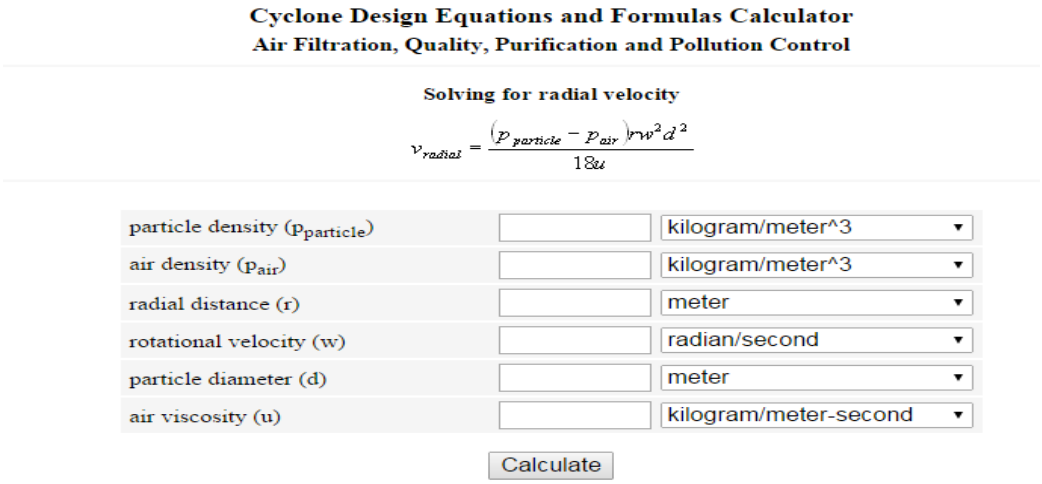

FIGURE 7. Online calculator that available in internet Retrieved 13 March 2015 http://www.ajdesigner.com/phpcyclone/cyclone_equation_radial_velocity.php

2.6 Comparative Study

2.6.1 Comparison between Technologies

The main purpose of this project is to come out with a mobile application that can easier user to calculate the efficiency of the cyclone. In order to determine needed in our mobile application development we do some comparison with existing software and online system available now. Here, in this section, we will make some comparison between three technologies which have the same functionality which is calculate efficiency of the cyclone. Thus, two identified technologies that share the same functionalities are Sysmatec and online calculator that available online in internet.

Features	Sysmatec (software)	Online Calculator	Mobile Applications
Accessibility	Limited	Limited Depends on internet	Anywhere
Interactive	Yes	Yes	Yes
User Friendly	Yes	No	Yes

TABLE 1. Table of Comparison between Technologies

2.7 Conclusion

There are many software and online calculator which are designed especially for calculate the efficiency of the cyclone. There are no any mobile application that are designed specifically for calculate the efficiency of the cyclone. As conclusion we proposed to develop mobile application for calculate the efficiency the cyclone in order to make the user more comfortable to use the application anytime and anywhere.

CHAPTER 3

METHODOLOGY

3.0 METHODOLOGY

Methodology is a term which can be best used to explain the analysis of principles or rules and methods employed by a discipline. It can also be used in reference to study or description of methods that have been applied to a particular study. In most circumstances, the use of a methodology does not describe the details but it is often reflected in the product of work in which it is applied. In this chapter, we will describe what had been done throughout this project starting from the beginning. The Rapid Application Development (RAD) has been chosen as the SDLC methodology.

3.1 Research Methodology

3.1.1 Problem Identification

This phase is the very important phase that needs to be done in order to get rough idea on the project would be designed. Problem statement must be stated clearly so that it can provide the suitable solution to overcome the problem occur. Solutions that have been proposed must be achievable, reliable, realistic to achieve and in follow the timeline that has been giving by the university. Moreover, the purpose of the project must be explained well to make sure the need of the project can be achieve. It must meet the

audience expectation and bring good returns to them. Besides, in this section objective of the project must be described well and go more deep in the scope area covered. Scope area will make the project more focused in specified area. By follow the scope area audience can predict their expectations and make the projects more achievable.

3.1.2 Data Gathering

Next, we need to gather information related with the problem stated before. We need to make sure this task must be complete before start design the solution for the chosen project. Data gathering can happen whether through interview, discussion, questionnaire and many more. The main method used for complete the research on this project is through readings. There are several resources that have been going through in order to get rough idea and possible solution for the project that has been proposed. Besides, we also read on system that has been developing before or any device that was implemented to solve problem which have some similarities with the project. As output of this reading is we make comparative view between existing solution and proposed solution on mobile application.

3.1.3 Comparative Study

The project is proposed mobile app to calculate efficiency of the cyclone. So, the solution proposed must be fulfilling the existing software used by control engineer manually. From the reading that has been done, several software was found in order to calculate the efficiency. All the software was being compared to make the mobile app was compatible as the existing software. Some features have been taken into discussion on how to make the mobile app can make the user more comfortable.

3.1.4 Rapid Application Development Methodology

The figure displays the task given, on what need to be developed on the project. Each task needs to be completed during the given period of time if not; the delayed task will be brought up to the next period of time. Given the limitation factor of developing the project is timing, the developer need to commit on a certain number of task in which the task that they have commit need to be on the environment whether it is feasible enough to implement the project. There are some few errors found regarding the environment that has been agreed upon to develop the project because some the project features requires a certain modifications on the software and that will break the functionalities, the solution is to simplify the requirement to cope with what the environment can do.

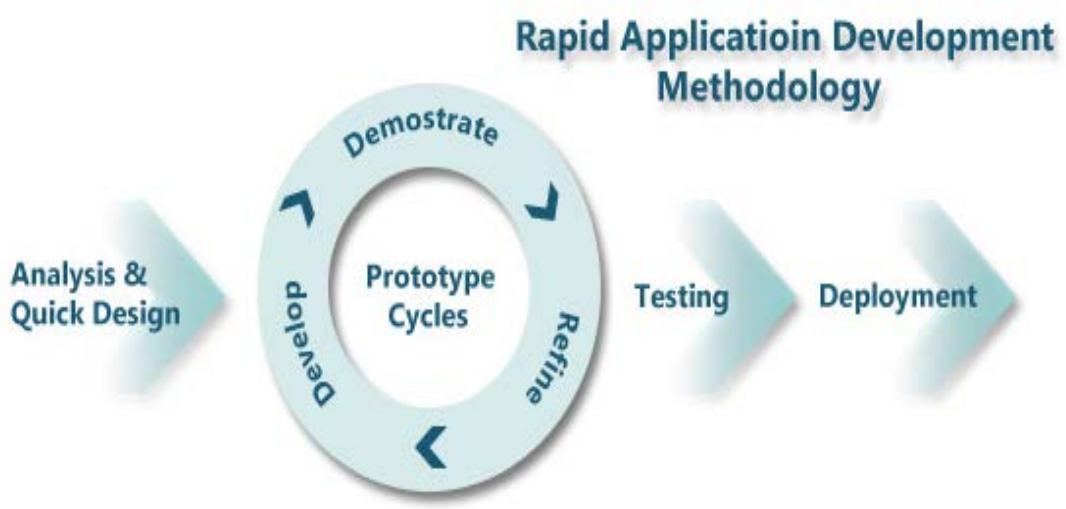

FIGURE 8. Rapid Application Development diagram Retrieved 11 March 2015, from http:// www.indosakura.com

To start of the project, in this section we are proposed system architecture for this project. In this section, we start to design the proposed system architecture for this project. Rapid Application Development (RAD) methodology used minimal planning in favor of rapid prototyping, allowing software to written faster and makes it easy to change the requirement. RAD approach is suitable for projects where objectives are well defined and narrow, data set for project already exists, decision can be taken quickly, development team is small and architecture of project is well defined. (Ramsoft, 2012)

To start of the project, the first step in the RAD is followed which are the analysis and quick design; the information is collected from journal, articles or any past research paper. The information needs to be carefully and thoroughly checked because of the documentation can become a proof of the commitment for the developer to implement the requirements that has been agreed on.

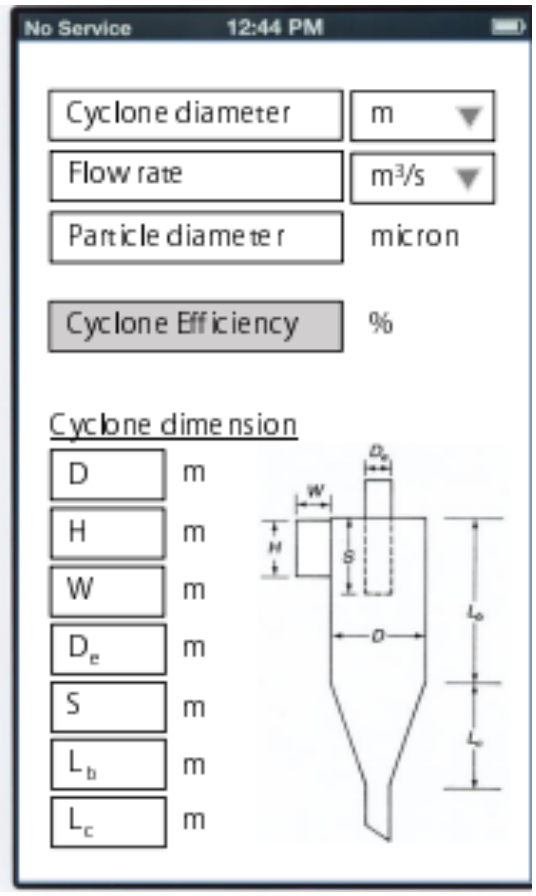

FIGURE 9. Proposed interface for mobile application

The next step in the RAD is Prototype Cycle step whereby consist of another three elements such as develop, demonstrate and refine the design and problem statement stated in chapter One. After prototype cycle had been done to develop the project, the next step is to conduct a testing on the project that has been developed. Last but not least, the step is deployment. At this stage or level any changes will be done if there are any problem in testing activity.

3.1.4 Project Testing

The growing embracement of smart phones, tablets and other mobile devices has fuelled the escalation of mobile applications in latest years. Mobile devices have become the key standard of communication for users as well as business worldwide, and mobile applications are motivating these relations

Of course, a brawny mobile app development approach is the groundwork of any thriving mobile app, but there's one key constituent in app development that makes certain that our mobile app gathers user expectations

Mobile application testing is the eminence test your mobile apps have to pass before they reach their target mobile devices or app stores, and become available for public.

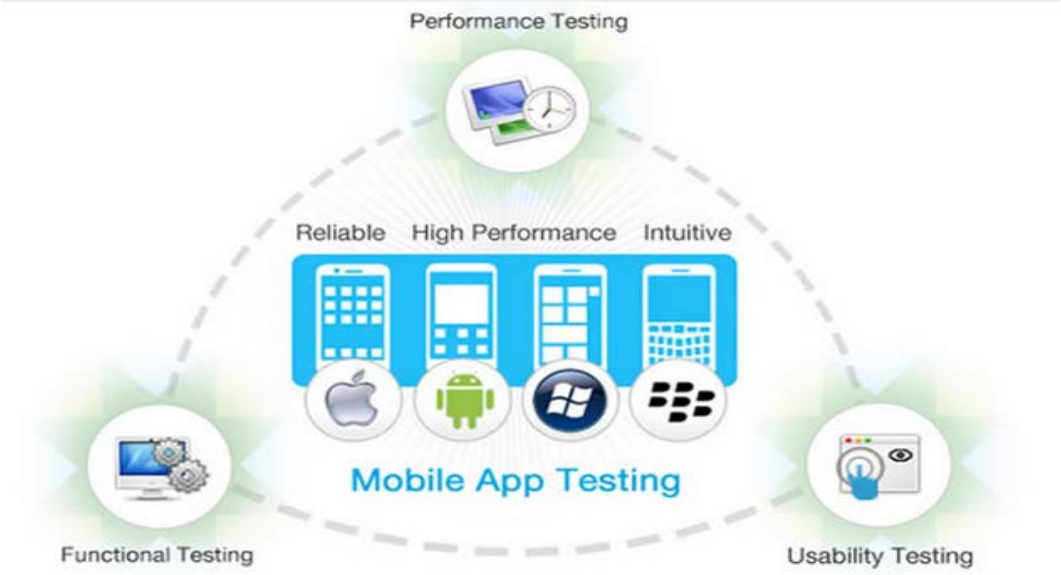

FIGURE 10. Mobile App Testing Diagram Adopted from Retrieved 7 March 2015, from http:// www.exuberantsolutions.com

3.2 Gantt chart

		Project Timeline								
No	*Data/Week*	*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEPT*
1	*Propose topic for FYP*									
2	*Planning and Research*									
3	*Design and simulation phase*									
4	*Optimization of design phase*									
5	*Presentation phase*									

FIGURE 11. Gantt chart for Mobile Application development

3.3 Formula To Calculate the Efficiency

W/D	0.25	→	W	0.25*D
H/D	0.5	→	H	0.5*D
L_b/D	2.0	→	L_b	2.0*D
L_c/D	2.0	→	L_c	2.0*D
D_e/D	0.5	→	D_e	0.5*D
S/D	0.625	→	S	0.625* D

Firstly, program will calculate the dimension configurations for conventional cyclone. User can enter the value of the length.

Next, the program will calculate the area of inlet, A

$$A= HW$$

User need to determine the inlet velocity, V

$$V = Q/A$$

After that, the formula will calculate the effective turns and calculate the cut diameter.

Effective turns Formula:

$$\mathrm{Ne} = \frac{1}{H}\left[Lb + \frac{Lc}{2}\right]$$

Cut Diameter formula:

$$d_e = 1.1354 \times 10^{-4}\left[\frac{W}{N_e V}\right]^{\frac{1}{2}}$$

$$\eta = \frac{1}{1 + \left(\frac{d_c}{d_p}\right)^2}$$

The final answer will times 100 to get the efficiency in percent.

3.4 Data Flow of the mobile app

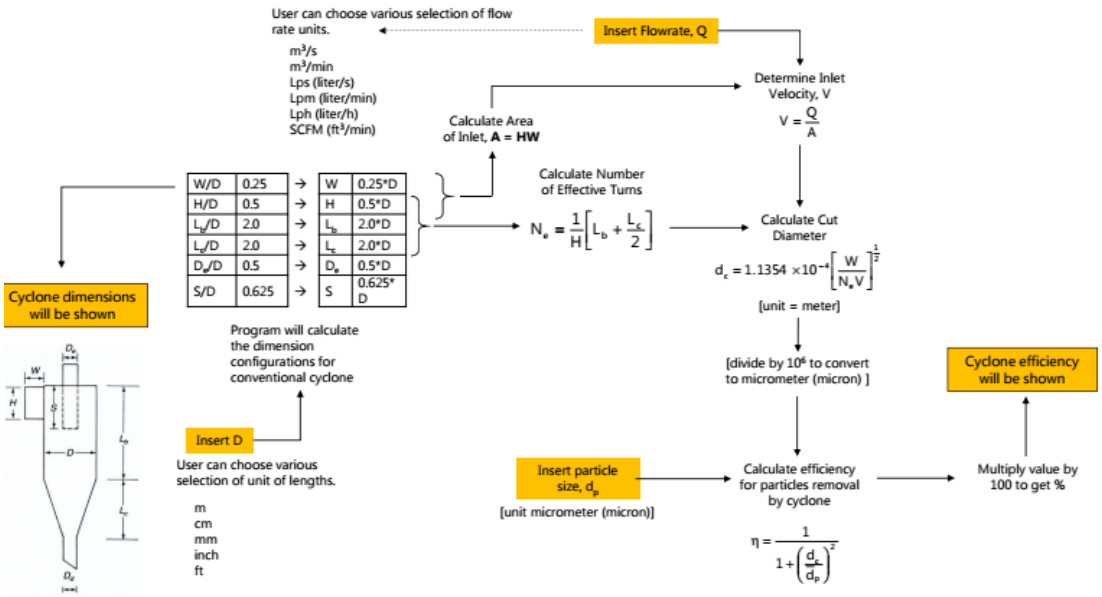

Figure 12 Data Flow of the cyclone efficiency calculation

3.5 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams are intended to model both computational and organisational processes. Activity diagrams show the overall flow of control.

Activity diagram is referring to the graphical representation of input and output data of a system which is most likely to be similar with the process flow. Data Flow is best used to represent from where the data come from and where will the data being stored and what will be the possible output of the mobile app. For a system to come out with the aspected result, there are some activity and decision that have to be made and all this will be in the system flow. For this section, we will design the system flow by using activity diagram as shown in Figure 13. The importance of having activity diagram in this research methodology are as a general overview of the system and at the same time it will be very usefull to visualize data processing.

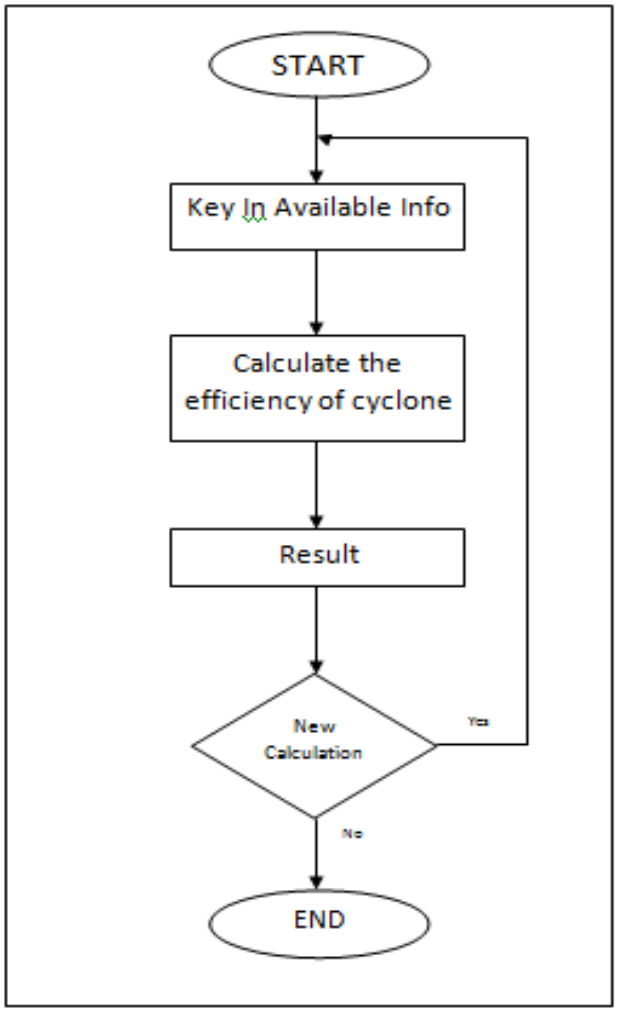

FIGURE 13 Proposed Activity Diagram of Mobile Application to calculate the efficiency of the cyclone

Referring to activity diagram in Figure 10, the process of the system start by first key in the available information. The information available will determine the cyclone efficiency.

3.6 Software use

App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT).

It allows beginners to create software applications for the Android operating system (OS). It provides a graphical interface, very similar to Scratch and the StarLogo TNG user interface, which allows users to drag-and-drop visual objects to create an application that can run on Android devices. In creating App Inventor, Google drew upon significant prior research in educational computing, as well as work done within Google on online development environments.

Open Blocks is distributed by the Massachusetts Institute of Technology's Scheller Teacher Education Program (STEP) and is derived from master's thesis research by Ricarose Roque. Professor Eric Klopfer and Daniel Wendel of the Scheller Program supported the distribution of Open Blocks under an MIT License (Wikipedia,2012).

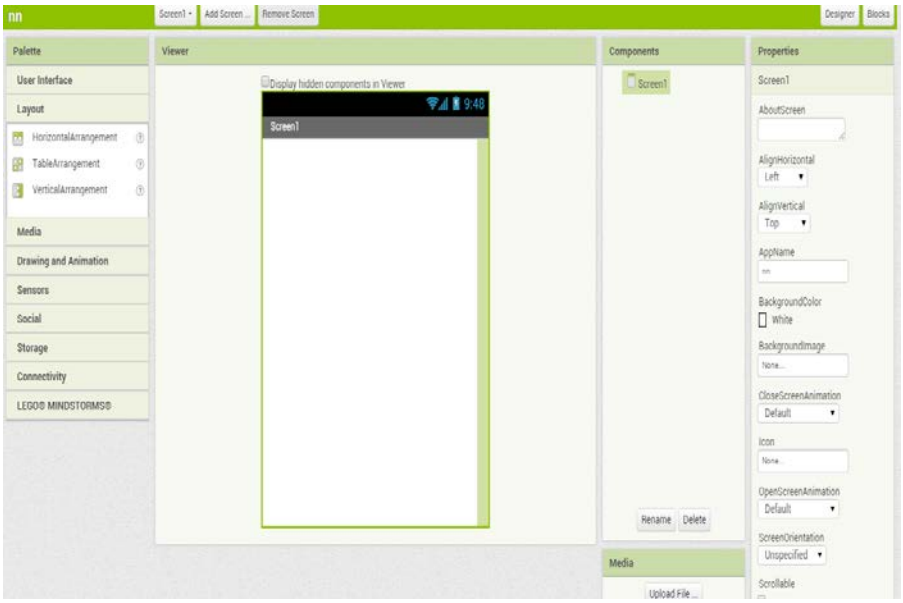

FIGURE 14. Basic template for mobile application development

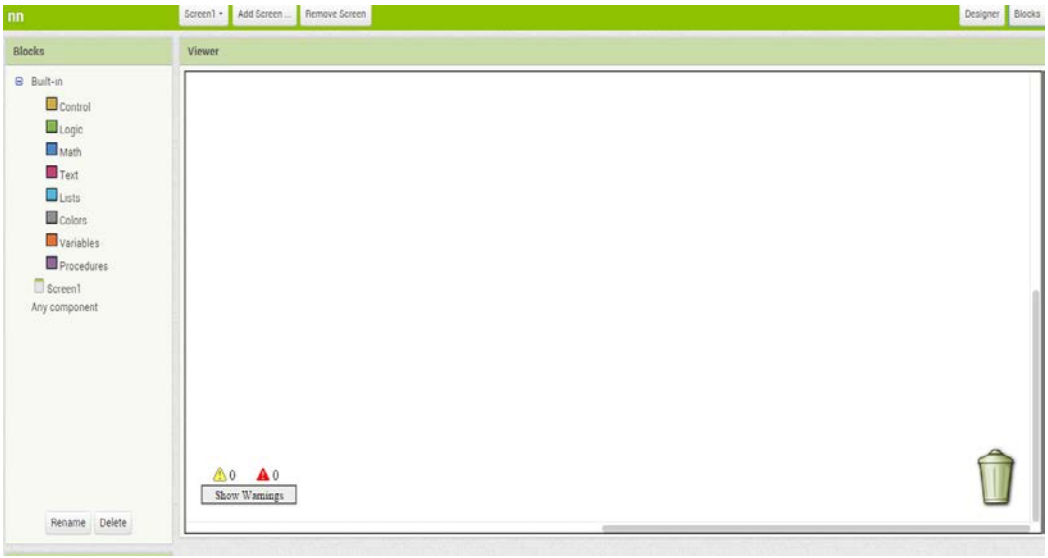

FIGURE 15. Coding template for make the mobile application functional

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

In this project, more experiments and improvement will be done to make sure the objectives of this project successful achieve. This section will describe the progress update that has been done.

4.2 Background On Target User

The target user for this project wea UTP student from Chemical Department. The students were taking major in environment. Mostly the user from 19-30 age range. This is because this range of age are familiar using smart phone.

4.3 Qualitative results

The questionnaire has been done after the testing process. The survey focus on the acceptance of the user towards the apps and how the apps can help student in study.

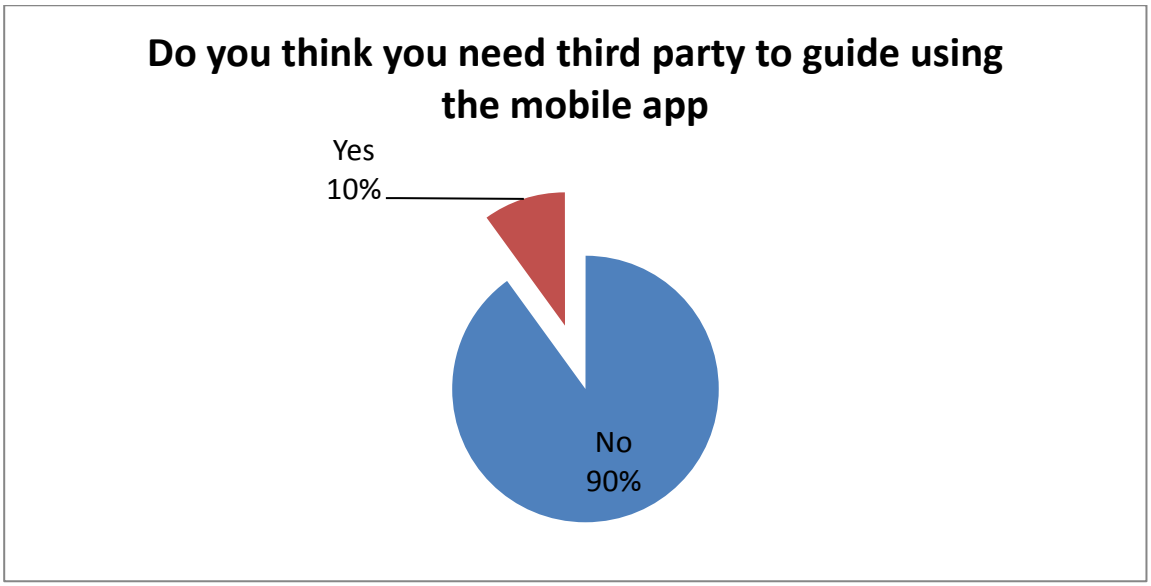

FIGURE 16 : Respoonse after use the application

Figure above shows the percentage of the response on the needed of third party when using the application. Majority agree that they did not need third party or any guideline to use the application because the interface are straight forward show the calculation section. This shows that user can use the applications direct after have it on their phone without need any third party to explain the steps to use it.

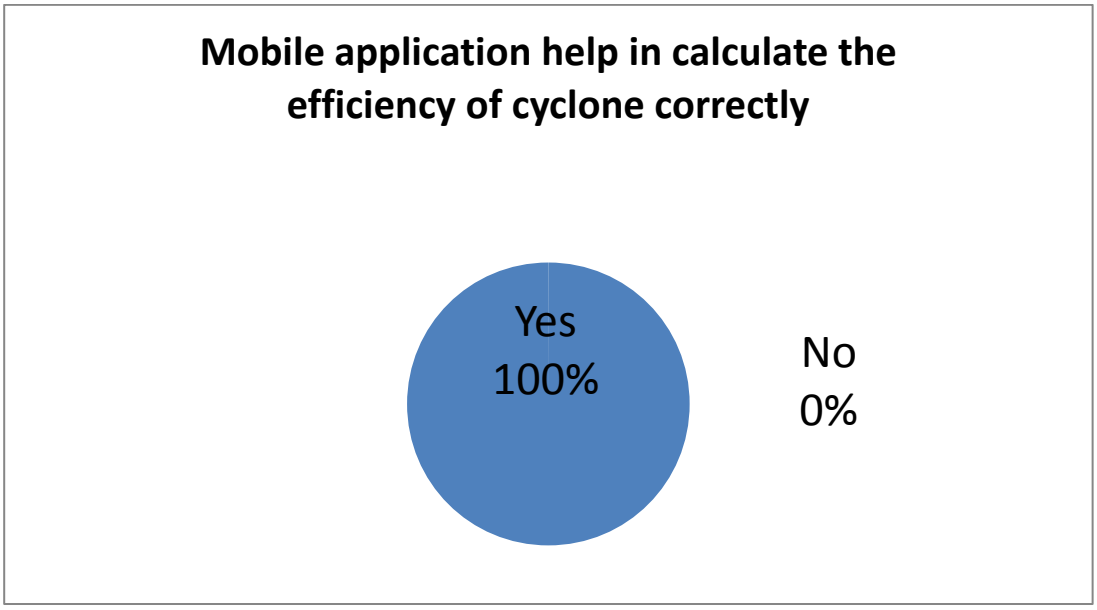

FIGURE17 ; Mobile application help in calculate the efficiency of cyclone correctly.

Figure shows all the respondent agree mobile application help in calculate the efficiency of the cyclone correctly. This result shows that mobile apps can help user to calculate the efficieny of the cyclone correctly and effectively.

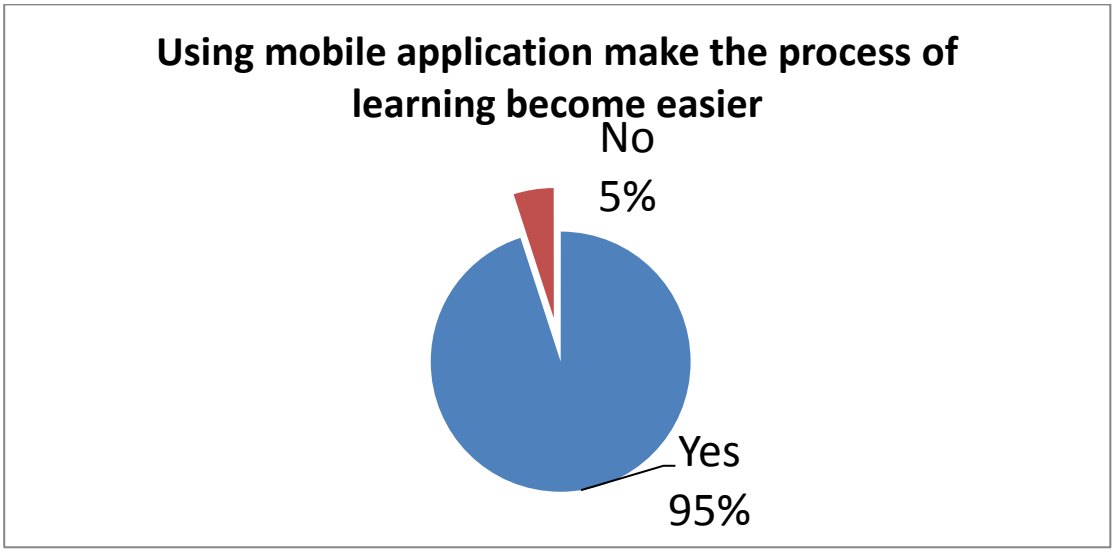

FIGURE 18 : Student views on the learning process become easier when using mobile applicaton

Figure above shows the percentage of student agree that learning process become easier when using mobile application. From the result shows that there is one student does not agree wiyh the statement. This is because that student prefer using the available source that available. Plus, that student also not good in using touch scrren device.

4.4 Prototype overview

By following the requirement need, prototype of the application was developed. There are the interface of the mobile application .

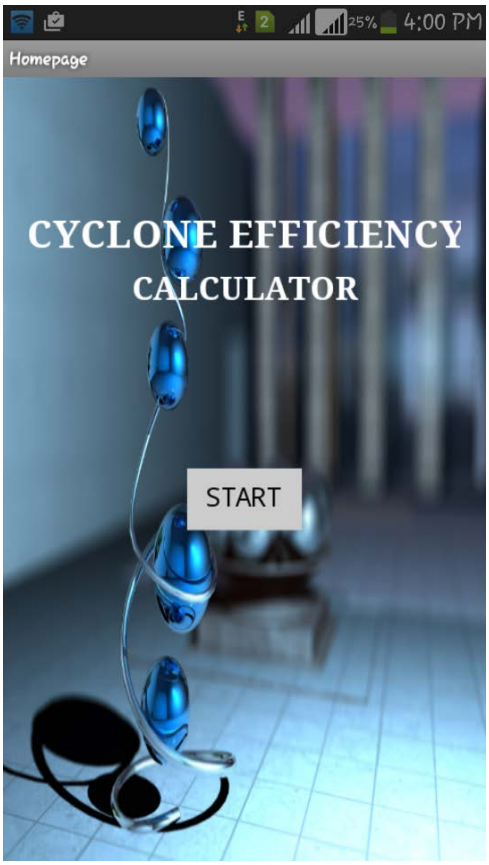

FIGURE 19 : Homepage of the apps

The main page of this system consists only start button that will go to calculator page.

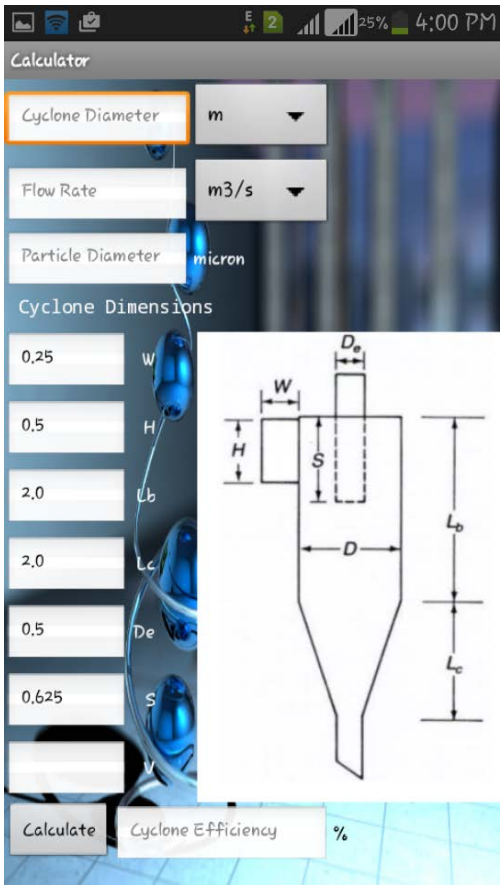

FIGURE 20. Calculator page for the mobile apps

This is the calculator page. User need to fill in the information neede and the application will calclate the efficiency of the cyclone automatic after user click button calculate.

4.5 Testing

The testing conduct in class consist of 20 student from chemical department. Firstly, student will calculate using formula manually and the time taken to finish the calculation was record. After that, student will calculate the efficiency of the cyclone using the mobile application. The result of student taken to calculate manually will be compare with time taken using mobile application.

Student	Gender	Time - Manual Calc (min)	Time - Manual Calc (s)	Time - Using App (s)
1	M	6.0	360	13.00
2	M	14.0	840	35.86
3	M	15.0	900	14.00
4	M	14.0	840	26.34
5	M	13.0	780	22.52
6	M	7.0	420	26.22
7	M	6.0	360	23.00
8	M	6.0	360	25.00
9	M	6.5	390	32.76
10	M	7.0	420	16.75
11	F	9.0	540	19.00
12	F	6.0	360	15.00
13	F	5.0	300	15.00
14	F	14.0	840	10.00
15	F	10.0	600	43.87
16	F	10.0	600	33.00
17	F	14.0	840	26.34

18	M	13.0	780	22.52
19	M	7.0	420	26.22
20	M	6.5	390	32.76

TABLE 2. Time taken between calculate the efficiency nof the cyclone manually and using mobile application

The table shows the result comparing the time taken to calculate the efficiency of the cyclone using mobile application and calculate the formula manually. The result if student calculate it manually:

- Slower : 15 minute
- Faster : 5 minute
- Average time : 9.45 minute

Time taken if student calculate using mobile application ;

- Slower : 43.87 sec
- Faster : 10 sec
- Average time : 23.96 sec

Based on the result, we can conclude that less time consume if using mobile application compare than calculate it manually. So this result prove that mobile application make the work become easier. Rather than need to calculate the formula manually.

FIGURE 21. 20 student participate the testing of the mobile application

CHAPTER 5

CONCLUSION

5.1 Conclusion

5.1.1 Introduction

This apps is a mobile application for chemical engineer to calculate efficiency of the cyclone at anytime and anywhere. The report focus on the methodology used in complete the mobile application for calculate efficiency of the cyclone. Techniques that have been used in the project were study and making comparison between existing ways, study about the flow of the application and research on how to develop mobile app. By developing this project, hopefully the mobile app will help chemical engineer in calculate efficiency of the cyclone.

5.1.2 Summary

There are many software and online calculator which are designed especially for calculate the efficiency of the cyclone. There are no any mobile application that are designed specifically for calculate the efficiency of the cyclone. As conclusion we proposed to develop mobile application for calculate the efficiency the cyclone in order to make the user more comfortable to use the application anytime and anywhere.

5.1.3 Future Work

This project is recommended to further improvement such as graphic and animation related the diagram.

5.1.4 Conclusion

This mobile app help the user to easy use it at anywhere and anytime. If the implementations will be continuing, it is will be achieve the objective of this project.

- To investigate the current ways in calculating the efficiency of the cyclone
- To develop mobile application to calculate the efficiency of the cyclone
- To test the mobile application impact in fieldwork task

This application is successfully complete and working as the propose idea. However, there are a lot of improvements that need to be done especially on the design and interfaces.

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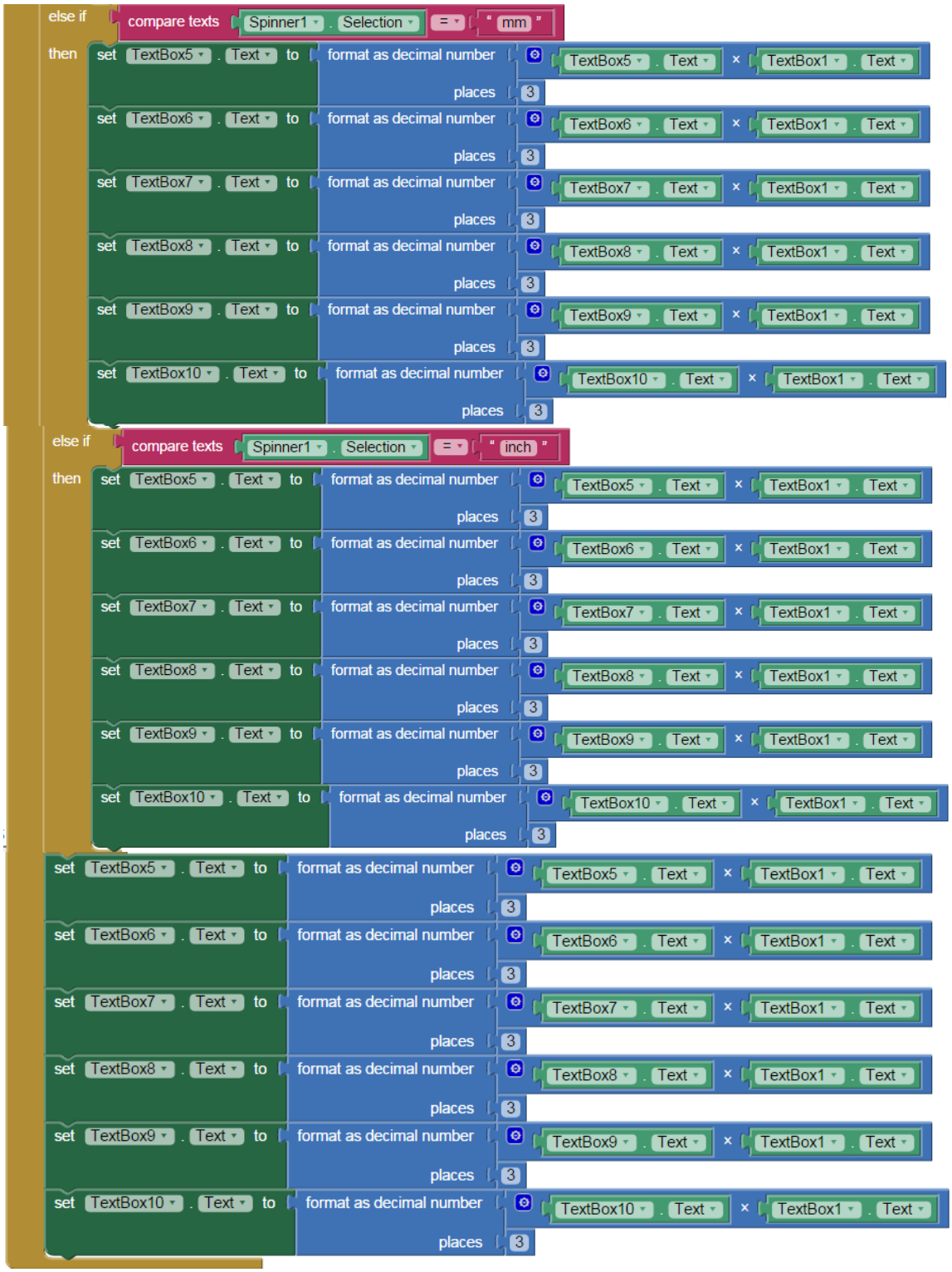
APPENDICES


when Button1 .Click
do open another screen screenName " Screen2 "


when Spinner1 .AfterSelecting
selection
do if compare texts Spinner1 . Selection = " cm "
then set TextBox5 . Text to format as decimal number TextBox5 . Text × TextBox1 . Text
places 2
set TextBox6 . Text to format as decimal number TextBox6 . Text × TextBox1 . Text
places 2
set TextBox7 . Text to format as decimal number TextBox7 . Text × TextBox1 . Text
places 2
set TextBox8 . Text to format as decimal number TextBox8 . Text × TextBox1 . Text
places 2
set TextBox9 . Text to format as decimal number TextBox9 . Text × TextBox1 . Text
places 2
set TextBox10 . Text to format as decimal number TextBox10 . Text × TextBox1 . Text
places 2
else if compare texts Spinner1 . Selection = " m "
then set TextBox5 . Text to format as decimal number TextBox5 . Text × TextBox1 . Text
places 3
set TextBox6 . Text to format as decimal number TextBox6 . Text × TextBox1 . Text
places 3
set TextBox7 . Text to format as decimal number TextBox7 . Text × TextBox1 . Text
places 3
set TextBox8 . Text to format as decimal number TextBox8 . Text × TextBox1 . Text
places 3
set TextBox9 . Text to format as decimal number TextBox9 . Text × TextBox1 . Text
places 3
set TextBox10 . Text to format as decimal number TextBox10 . Text × TextBox1 . Text
places 3


else if
compare texts
Spinner1 . Selection
=
" mm "
then
set TextBox5 . Text to
format as decimal number
TextBox5 . Text × TextBox1 . Text
places 3
set TextBox6 . Text to
format as decimal number
TextBox6 . Text × TextBox1 . Text
places 3
set TextBox7 . Text to
format as decimal number
TextBox7 . Text × TextBox1 . Text
places 3
set TextBox8 . Text to
format as decimal number
TextBox8 . Text × TextBox1 . Text
places 3
set TextBox9 . Text to
format as decimal number
TextBox9 . Text × TextBox1 . Text
places 3
set TextBox10 . Text to
format as decimal number
TextBox10 . Text × TextBox1 . Text
places 3
else if
compare texts
Spinner1 . Selection
=
" inch "
then
set TextBox5 . Text to
format as decimal number
TextBox5 . Text × TextBox1 . Text
places 3
set TextBox6 . Text to
format as decimal number
TextBox6 . Text × TextBox1 . Text
places 3
set TextBox7 . Text to
format as decimal number
TextBox7 . Text × TextBox1 . Text
places 3
set TextBox8 . Text to
format as decimal number
TextBox8 . Text × TextBox1 . Text
places 3
set TextBox9 . Text to
format as decimal number
TextBox9 . Text × TextBox1 . Text
places 3
set TextBox10 . Text to
format as decimal number
TextBox10 . Text × TextBox1 . Text
places 3
set TextBox5 . Text to
format as decimal number
TextBox5 . Text × TextBox1 . Text
places 3
set TextBox6 . Text to
format as decimal number
TextBox6 . Text × TextBox1 . Text
places 3
set TextBox7 . Text to
format as decimal number
TextBox7 . Text × TextBox1 . Text
places 3
set TextBox8 . Text to
format as decimal number
TextBox8 . Text × TextBox1 . Text
places 3
set TextBox9 . Text to
format as decimal number
TextBox9 . Text × TextBox1 . Text
places 3
set TextBox10 . Text to
format as decimal number
TextBox10 . Text × TextBox1 . Text
places 3


when Spinner2 .AfterSelecting
selection
do if compare texts Spinner2 . Selection = " m3/s "
then set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text
else if compare texts Spinner2 . Selection = " m3/min "
then set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text
else if compare texts Spinner2 . Selection = " liter/s "
then set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text
else if compare texts Spinner2 . Selection = " liter/min "
then set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text
else if compare texts Spinner2 . Selection = " liter/h "
then set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text
set TextBox11 . Text to TextBox5 . Text / TextBox5 . Text × TextBox6 . Text